

CLAIMS

What is claimed is:

1. A dual lens, having an aperture, comprising:

a first lens portion, formed of a first optical material, occupying a
5 first portion of the aperture of the dual lens; and

a second lens portion, formed of a second optical material,
occupying a second portion of the aperture of the dual lens.

2. The dual lens of Claim 1, wherein the first portion of the aperture and the

10 second portion of the aperture are circular.

3. The dual lens of Claim 2, wherein the first portion of the aperture and the
second portion of the aperture are concentric.

15 4. The dual lens of Claim 1 wherein the first optical material transmits at least
a first band of optical wavelengths and the second optical material transmits
at least a second band of optical wavelengths.

20 5. The dual lens of Claim 4, wherein the first band of optical wavelengths is
an infrared band, and the second band of optical wavelengths is a visible
band.

6. The dual lens of Claim 4, wherein the first portion of the aperture and the
second portion of the aperture are circular.

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7. The dual lens of Claim 6, wherein the first portion of the aperture and the
second portion of the aperture are concentric.

8. The dual lens of Claim 1, wherein the second portion of the aperture is defined by a hole bored through the first optical material, and a portion of the second optical material is disposed within the hole.

5 9. A dual optical system, comprising:

 a first optical subsystem, comprising a first set of lenses, wherein, a portion of the first set of lenses comprise cut-out sub-apertures; and

10 a second optical subsystem, comprising a second set of lenses; wherein, a portion of the second set of lenses are positioned within the sub-apertures of the first set of lenses.

15 10. The dual optical system of Claim 9, wherein the first optical subsystem transmits at least a first band of optical wavelengths and the second optical subsystem transmits at least a second band of optical wavelengths.

11. The dual optical system of Claim 10, wherein the first set of lenses, the second set of lenses, and the sub-apertures are circular.

20 12. The dual optical system of Claim 11, wherein a portion of the first set of lenses and a portion of the second set of lenses are disposed along a common optical axis.

25 13. The dual optical system of claim 12, wherein the first optical subsystem is capable of producing a first image and the second optical subsystem is capable of producing a second image.

14. The dual optical system of claim 13, wherein the first optical subsystem comprises a first subsystem focus group, the second optical subsystem

comprises a second subsystem focus group, and wherein the dual optical system further comprises a first focus mechanism, attached to and capable of moving the first and second sub-system focus groups.

5 15. The dual optical system of claim 14, wherein the first band of optical wavelengths is an infrared band, and the second band of optical wavelengths is a visible band.

10 16. The dual optical system of claim 10, wherein the first optical system comprises a first subsystem focus group, the second optical subsystem comprises a second subsystem focus group, and the dual optical system further comprises a first focus mechanism, attached to and capable of moving the first and second sub-system focus groups.

15 17. The dual optical system of claim 16, wherein the first band of optical wavelengths is an infrared band, and the second band of optical wavelengths is a visible band.

18. The dual optical system of Claim 9, further comprising:

20 a focus element, the focus element comprising:

 a first lens, capable of refracting light of a first band of optical wavelengths, and having an aperture cut through it; and

25 a second lens, capable of refracting light of a second band of optical wavelengths, fixed in the aperture of the first lens; and

 a focus mechanism, attached to the focus element, capable of moving the focus element.

19. The dual optical system of claim 18, wherein the first optical subsystem
is capable of producing a first image formed of light from the first optical
wavelength band, and the second optical subsystem is capable of producing a
second image from light of the second optical wavelength band, and wherein
5 motion of the focus element adjusts the focus of both the first image and
second image.

20. The dual optical system of Claim 19, wherein the optical system is
receptive of light along a common light path, and further comprising:

10 a first output light path;
 a second output light path; and
 a fold element, capable of directing a portion of light of the first
 optical band along a first output light path,
 and wherein light of the second optical band exits along a second
15 output light path.

21. The dual optical system of claim 20, wherein the first band of optical
wavelengths is an infrared band, and the second band of optical wavelengths
is a visible band.

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22. The dual optical system of Claim 20, further comprising:
 a first recording means, for recording the first image positioned
 in the first output path; and
 a second recording means, for recording the second image
25 positioned in the second output path.

23. The dual optical system of Claim 22, further comprising display means,
for displaying the first image and/or the second image to an operator.

24. The dual optical system of any of claim 23, wherein the first band of optical wavelengths is an infrared band, and the second band of optical wavelengths is a visible band.

5 25. The dual optical system of claim 9, wherein

the first optical subsystem further comprises a first variator group and a first compensator group, and

wherein the second optical subsystem further comprises a second variator group in contact with the first variator group and a second

10 compensator group in contact with the first compensator group, and

wherein the dual optical system further comprises a zoom mechanism, capable of moving the first and second variator groups and the first and second compensator groups.

15 26. A dual optical band lens, produced by a process comprising:

figuring a first lens element;

forming a hole in the first lens element;

figuring a second lens element; and

securing the second lens element within the hole in the first lens

20 element.

27. A method for forming a dual band lens, comprising:

figuring a first lens element;

creating a hole in the first lens element;

25 figuring a second lens element; and

securing the second lens element within the hole in the first lens

element.

28. A dual band optical system, comprising:

a first imaging means, receptive of light of a first wavelength band, for forming a first image, and having a first annular aperture;

5 a second imaging means, receptive of light of a second wavelength band, for forming a second image, and having a second aperture, wherein the second aperture is contained within the first aperture; and

10 a focusing means, for adjusting focus of the first image and the second image, simultaneously.

29. A dual band lens, having a visible optical path and an infrared optical path, comprising:

a dual-band focus group, comprising

15 an annular first infrared lens element having an inner radius, and

a circular first visible lens element, located within the inner radius of the annular infrared lens element;

20 a fixed infrared imaging group, comprising a plurality of fixed infrared lens elements; and

a fixed visible imaging group, comprising a plurality of fixed visible lens elements;

25 wherein, the dual band focus group and the fixed infrared imaging group are placed along the infrared optical path, and wherein the dual and focus group and the fixed visible imaging group are placed along the visible optical path.

30. The dual band lens of Claim 29, wherein a portion of the plurality of fixed infrared lens elements comprise cut-out sub-apertures, and wherein a portion of the visible optical path passes through the cut out sub-apertures.

5 31. The dual band lens of Claim 30, further comprising:

 a dual-band variator group, comprising an infrared variator element positioned along the infrared optical path and a visible variator element positioned along the visible optical path, in contact with the infrared variator element;

10 a dual-band compensator group, comprising an infrared compensator element positioned along the infrared optical path and a visible compensator element positioned along the visible optical path, in contact with the infrared compensator element; and

15 a zoom mechanism, in contact with the dual band variator group and the dual band compensator group, capable of zooming the dual band lens.

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